

**Galileo Observations of Dark Terrain on Ganymede: Geological Mapping of the Galileo Regio Target Site.** L. Prockter<sup>1</sup>, J.W. Head<sup>1</sup>, D. Senske<sup>2</sup>, G. Neukum<sup>3</sup>, R. Wagner<sup>3</sup>, U. Wolf<sup>3</sup>, R. Greeley<sup>4</sup> and the Galileo Imaging Team.  
<sup>1</sup>Brown University, Dept. of Geological Sciences, Box 1846, Providence, RI 02912, <sup>2</sup>JPL, Pasadena, CA, <sup>3</sup>DLR, Berlin, Germany, <sup>4</sup>Arizona State University, Tempe, AZ.

Voyager data were interpreted to show that dark terrain (which comprises almost half of the satellite) is a nearly primordial impact-generated surface, consisting of furrow sets, impact craters, dark plains and palimpsests. Initial Galileo images of Galileo Regio show a surprisingly heterogeneous terrain. On the basis of albedo and morphological variations we distinguish several units within those units identified from Voyager data, such as: furrow rims; walls and floors; crater rims; floors and ejecta; dark plains; and palimpsests. We find that the furrow and crater units are in agreement with the Voyager interpretations, while the dark plains can be subdivided into at least three units on the basis of albedo. We also find bright material in the form of isolated knobs and massifs, which are not obviously associated with other units.

We here present a preliminary geological map of the Galileo G1 target area using data from the G1 and G2 orbits (the G2 data provide stereo coverage over approximately one-third of the G1 target site). We have produced a preliminary map on the basis of stratigraphic relationships within the area and we are calibrating this with crater counts. The area imaged by Galileo is approximately 110 km north to south by 150 km east to west. This area can be broadly subdivided into three main terrain types; bright (high albedo) material, found on furrow and crater rims and as isolated massifs; dark (low albedo) material, found on furrow and crater floors, surrounding elevated units, and in 'pockets' between hummocky plateau regions; and intermediate albedo material, found as a relatively smooth deposit in the center of a palimpsest and as a plains units surrounding other units.

**Furrows:** Furrow sets are found throughout the area (1, 2). Using the classification system of Murchie et al (1), System I furrows run NW - SE (figure 1, f1) and are cross-cut by by younger, N-S trending System II furrows (figure 1, f2). Two smaller and possibly separate sets are also seen; one runs E-W just above the center of the image mosaic (figure 1, f3), while a second runs WNW - ESE (figure 1, f4). Neither of these furrows has any observable rims. The rims of the main furrow systems consist of bright, spatially continuous material on one or both sides of the furrow. Furrow floors contain the lowest albedo material within the target area. This material appears to be relatively lightly cratered and is smooth or hummocky.

**Isolated massifs and plateau unit:** Isolated, topographically high bright 'knobs' or massifs are common throughout the northern part of the imaged region. On the basis of albedo we interpret these to be the remnants of crater and/or furrow rims. A large high albedo area in the west of the image is interpreted from the stereo data to be a large plateau (pb), apparently comprised of knobs of bright material. This plateau is visible on Voyager images and appears to be associated with the main furrow system, either as part of a rim, or as material extruded along furrows (3).

**Inter-furrow plains material:** While the lowest albedo material is found on the furrow floors, two higher albedo units are distributed throughout the plains between the furrow systems. The darker of these units is

fairly evenly distributed throughout the target area, although it appears to be closely associated with the bright furrow rims and isolated massifs. This unit appears to be less heavily cratered (and therefore younger) than the highest albedo inter-plains unit, which is probably the oldest plains unit. This unit is sparse in the eastern half of the region, where it may have been erased by the furrow systems which intersect here.

**Craters and associated deposits:** In the lower center of the image is a ~20 km crater (proposed name Ea) which appears to be partially filled with dark hummocky deposits (ef), and which may have a domed floor. There is an area directly to the north of this crater which we interpret to be part of the crater's continuous ejecta deposit. In the north-east corner of the image is a large hummocky deposit (h) interpreted to be ejecta from a large (~50 km) crater (proposed name Khepri), to the north just out of the target area. This ejecta effectively buries all preexisting features in the area, save for some bright linear features which are interpreted to be furrow rims, and two ~10 km crater rims which are seen in the north-east corner of the area. In the east of the imaged region is a sub-circular unit (p) interpreted to be a degraded palimpsest (proposed name, Heliopolis Facula), possibly flooded with volcanic deposits. The unit is of intermediate albedo and stereo imaging shows that it is relatively smooth and slightly elevated above the surrounding plains. Similar-sized craters seen in the northern half of this unit are possibly secondaries from the impact crater (Khepri) which produced the hummocky ejecta unit (h).

**General stratigraphy:** The oldest unit in the Galileo Regio high resolution target area is interpreted to be an intermediate, heavily cratered plains unit. This unit predates a lower-albedo plains unit and it is likely that the major furrow systems formed at this time. The most prominent NW-SE-trending System I furrow is cross-cut by and therefore predates the N-S-trending System II furrow. The palimpsest deposit (p) in the east of the area may be one of the oldest features and is partially embayed by a deposit interpreted to be ejecta (h), originating from a 50 km crater just to the north of the Galileo image. Secondaries from the same impact may also be present on the palimpsest and surrounding terrain. This ejecta also post-dates both the System I and System II furrows. The 20 km crater (ef) in the lower center of the image postdates the intermediate plains unit. This crater predates a narrow, rimless furrow (f4) which trends WNW - ESE and cuts through both the crater and the high-albedo knobby plateau (pb) in the west. Detailed crater counts on these units will allow us to calibrate the tectonic and volcanic history of this region and to better understand the formation of dark terrain on Ganymede.

**References:** (1) Murchie S.L., J.W. Head and J.B. Plescia (1990) JGR, 95, B7, 10,743-10,768. (2) Prockter et al., this volume. (3) Lucchitta B.K., C.W. Barnes and M.F. Grotfelty (1992), USGS Map I-2289.

Figure 1: Major geological units of the high resolution target site within Galileo Regio, Ganymede.

